AMERICAN HIGHWAY USERS ALLIANCE

Unclogging America's Arteries 2015

Prescriptions for Healthier Highways

Submitted by: Councilmember
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APPENDIX B. OTHER ZONES OF CONGESTION IN US STATES

Our method used stringent criteria for identifying the national top 50 bottlenecks (see Appendix C). We also used an alternative method to identify additional congestion zones around the country. Although congested, the worst segments of highway do not have the same severe delays/mile (delay density) as the nationally ranking bottlenecks. In many cases, the areas below are the most congested in their respective states. The queue lengths and delay estimates on the list below use a different methodology than the list of top 50 discussed previously.

State	Area	Road name	Queue Length (Miles)	Annual Total Delay (hours)
Alabama	Birmingham	I20 between 23rd St N and 15th St N	0.8	135,200
Alabama	Birmingham	I65 between 6th Ave N and University Blvd.	1.1	190,060
Arizona	Phoenix	I10 between N 16th Street and N 7th Ave (North of downtown Phoenix)	1.9	600,080
Arizona	Phoenix	I17 through I10N near Phoenix Int'l Airport, between Sky Harbor Cir and S 24th Street	0.8	154,180
Arkansas	Little Rock	I630 between I430 and John Barrow Road	1.4	230,620
Connecticut	Hartford	I84 between Trumbull St and Park St	1.4	705,900
Connecticut	Stamford	I95 (Governor John Davis Lodge Turnpike) between Fairfield Ave and Elm St	1.3	494,000
Hawaii	Honolulu	IH1 between Ala Kapuna St and Exit 1D	0.7	607,100
Hawaii	Halawa	H201 at H3	0.1	78,260
Idaho	Boise	I84 between S Meridian Rd and SR55	1.8	119,080
Indiana	Indianapolis	I65 between W21st St and Central Ave	1.7	400,400
Indiana	Jeffersonville (Bordering Kentucky)	I65 from Indiana/Kentucky Border to Old Indiana 62	1.8	198,120
Iowa	Council Bluff (Bordering Nebraska)	I29 between Plaza View Dr and S Expressway St	2.3	117,520
Kansas	Wichita	US400 between Rock Rd and I35 (Kansas Turnpike)	2.6	375,180
Kentucky	Louisville	I64 at I65 between N Preston St and N Clay Street (North of Louisville Slugger Field)	0.4	102,700
Kentucky	Louisville	I65 at US150	1.0	241,540
Louisiana	New Orleans	US90 between Loyola Ave and Convension Center Blvd	0.9	741,780
Louisiana	Baton Rouge	I10 between Louise St and S River Rd	1.0	334,880
Maryland	Bethesda	I495 between SR190 and I270	1.9	705,120
Maryland	Bethesda	I495 between I270 (near SR355) and Cedar Ln	0.8	296,660
Michigan	Detroit	I75 north of I696 between W Lincoln Ave and Twelve Mile Rd	1.2	569,920

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Table of Contents

APPENDIX B. OTHER ZONES OF CONGESTION IN US STATES (CONTINUED)

State	Area	Road name	Queue Length (Miles)	Annual Total Delay (hours)
Michigan	Detroit	I94 between Rose Parks Blvd and Brush St (North of Wayne State University)	1.5	532,480
Minnesota	Minneapolis	I94 between W River Pkwy and 22nd Ave S	0.7	362,960
Minnesota	Edina	US169 between Crosstown Hwy and Valley View Rd	1.0	490,100
Mississippi	Jackson	I55 between Savanna St and I20	2.0	145,860
Missouri	St. Louis	I44 beween Eads Bridge and I70	1.1	417,560
Missouri	St. Louis	I64 between S 18th St and Historic US 66	0.7	225,852
Nebraska	Lincoln	I80 between US6 and Pinnacle Arena Dr (North of University of Nebraska - Lincoln)	0.7	118,300
Nebraska	Omaha	US6 between N 120th St and S 108th St (East of I680)	1.0	160,420
Nevada	Las Vegas	I15 between W Oakley Blvd and Exit 41 (Near Las Vegas North Premium Outlets)	0.9	258,180
Nevada	Las Vegas	US95 between Clarkway Dr and I15	0.7	172,640
New Hampshire	Epping	SR125 between SR101 and Water St	1.0	159,120
New Hampshire	Portsmouth	US4 between Woodbury Ave. and Nimble Hill Rd	0.9	128,440
New Mexico	Albuquerque	I25 between Osuna Rd NE and SR423	2.5	666,380
North Carolina	Raleigh	I440 between Exits 14 and 15	0.3	59,909
North Carolina	Charlotte	I485 between Exit 65 and 65B (Crossing South Blvd)	0.5	96,819
Ohio	Columbus	I670 between N 3th St and Exit 5 (east of I71)	1.7	293,280
Ohio	Cincinnati	I75 between Bank St and Ohio/Kentucky Border	2.6	433,160
Oklahoma	Oklahoma City	I235 at I44 between NW 59th St and NW 50th St	0.7	99,840
Rhode Island	Providence	I95 between Point St and O'Connel St	0.9	202,280
Rhode Island	Providence	I95 between US6 and SR146	0.6	142,480
Tennessee	Nashville	I40 at I65 between US ALT 31 and 12th Ave S	0.7	211,900
Tennessee	Nashville	I24 between I65 and Crutcher St	2.1	566,540
Utah	Salt Lake City	I15 between I215 and S Green St	0.9	101,400
Wisconsin	Milwaukee	US41 between W Watertown Plank Rd and W Bluemond Rd	0.8	245,960
Wisconsin	Milwaukee	I43 between W Canal St and SR145	1.1	267,280

Table of Contents

4. ***National Ranking:*** In the final step, we rank ordered all the bottlenecks identified in the adjacency analysis in Step 2, using the Daily Total Delay (hours) calculated in Step 3. We identified 3,500 hours of Daily Total Delay (or about 900,000 hours annually) as a natural break in the distribution of top-ranked bottlenecks. The final output of this analysis is the curated list of top 30 bottlenecks shown in Chapter 2. A number of bottlenecks in the same urban areas and a few other notables (ranks 31 – 50 nationally) are listed in Appendix A.

It is worth noting that in the AHUA's 2004 study, a 5-mile queue length was assumed by default for each bottleneck, and the locations identified were central chokepoints within this radius. The current study does not make this assumption. We allow the length of bottlenecks to vary based on estimated delays and the adjacency analysis described above. Furthermore, the 2004 study is based on queuing simulation models that factor in information such as volume, capacity, and other characteristics to predict daily delays. We limit our scope to estimated delays based on observed traffic probe data. For this reason, we cannot readily compare our 2015 study results to the original 2004 study.

HOW DID WE ESTIMATE THE LOST VALUE OF TIME DUE TO DELAYS?

We valued each hour of delay using the state-specific estimate of the value of a volunteer hour (US $/hour). This value is a weighted average of employment wage rates across many labor and skill sectors, and based on data collected by the US Bureau of Labor Statistics

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Table of Contents

(BLS). The organization Independent Sector summarizes the calculation process and presents a time trend of how the value of a volunteer hour has evolved over time in the US.[8] This approach most likely underestimates the lost value of time.

HOW DID WE ESTIMATE THE BENEFITS OF ALLEVIATING CONGESTION?

We estimated the fuel wasted due to congestion and potential fuel savings (gallons) using relationships between vehicle speed (miles per hour, mph) and fuel economy (miles per gallon, mpg) published by the Oak Ridge National Laboratory.[9] These relationships are based on lab tests as well as observed data from a large fleet of vehicles. Only the excess fuel used when vehicles are traveling at slow speeds during congested conditions are counted.

We then calculated the potential emissions avoided (pounds CO_2) using standard parameter values published by the US Environmental Protection Agency:[10]

CO_2 Emissions from a gallon of gasoline (for cars): 8,887 grams CO_2/ gallon

CO_2 Emissions from a gallon of diesel (for trucks): 10,180 grams CO_2/ gallon

To calculate the number of vehicle crashes that could possibly be avoided (number), we used the Transportation Research Board's analysis of accident data for the statistical relationships between total crashes and vehicle-miles traveled (VMT).[11]

[8] Independent Sector (2015). The Value of Volunteer Time. Accessed Nov 12, 2015. https://www.independentsector.org/volunteer_time

[9] Oak Ridge National Laboratory (September 2015). Transportation Energy Data Book. Chapters 4 and 5. Accessed Nov 12, 2015. http://cta.ornl.gov/data/index.shtml

[10] United States Environmental Protection Agency (EPA)(October 2014). *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 through 2014*. EPA-420-R -14-023a

Office of Transportation and Air Quality. United States Environmental Protection Agency (EPA) (May 2014). *Greenhouse Gas Emissions from a Typical Passenger Vehicle*, EPA-420-F-14-040a

[11] Potts et al. (2015). *Further Development of the Safety and Congestion Relationship for Urban Freeways*, Strategic Highway Research Program 2, Report S2-L07-RR-3

Table of Contents

Figure 2-1. 2035 Baseline Scenario Roadways Operating at LOS E or F in AM Two-Hour Peak Period

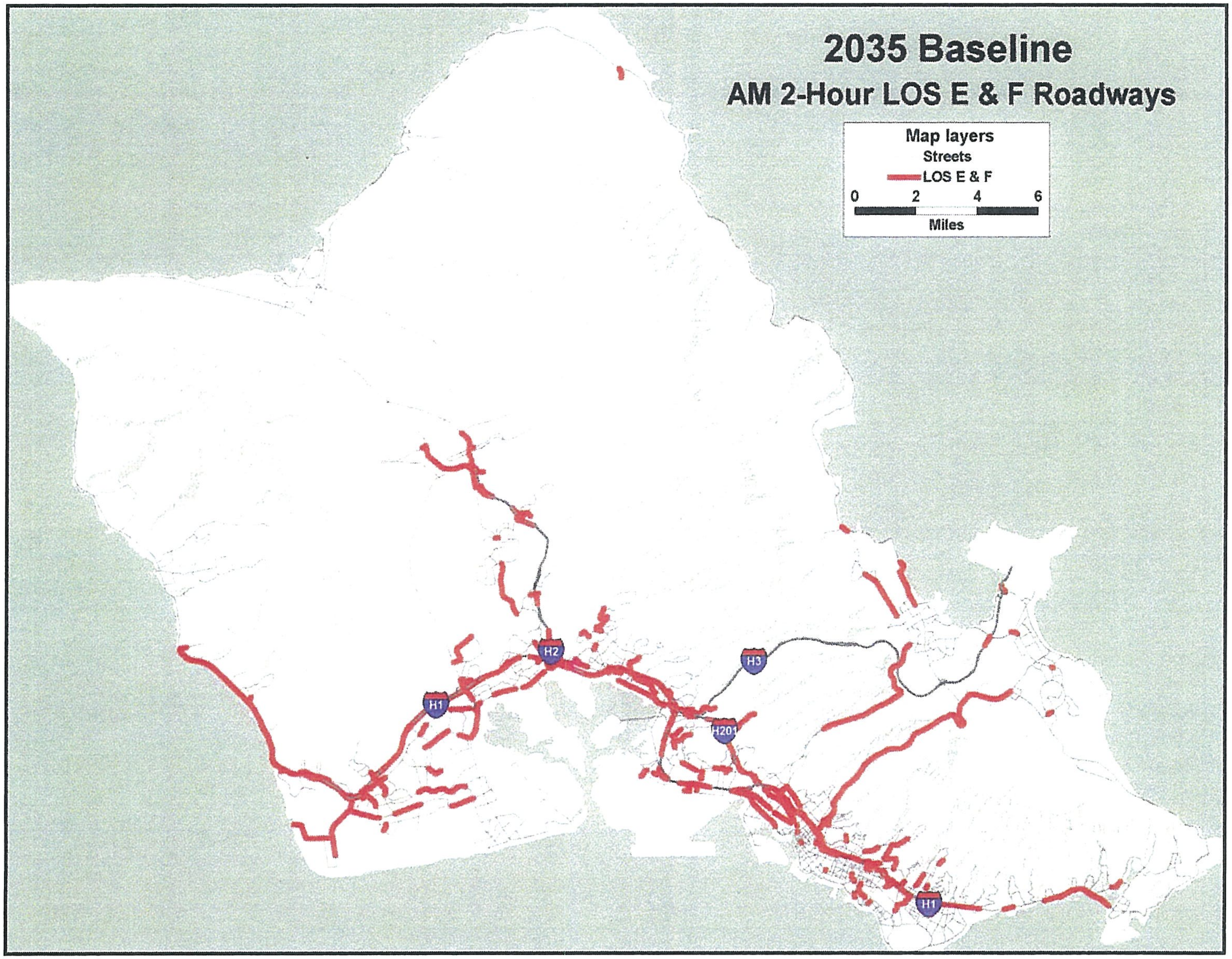

Figure 1-1. Map of CMP Projects Packages

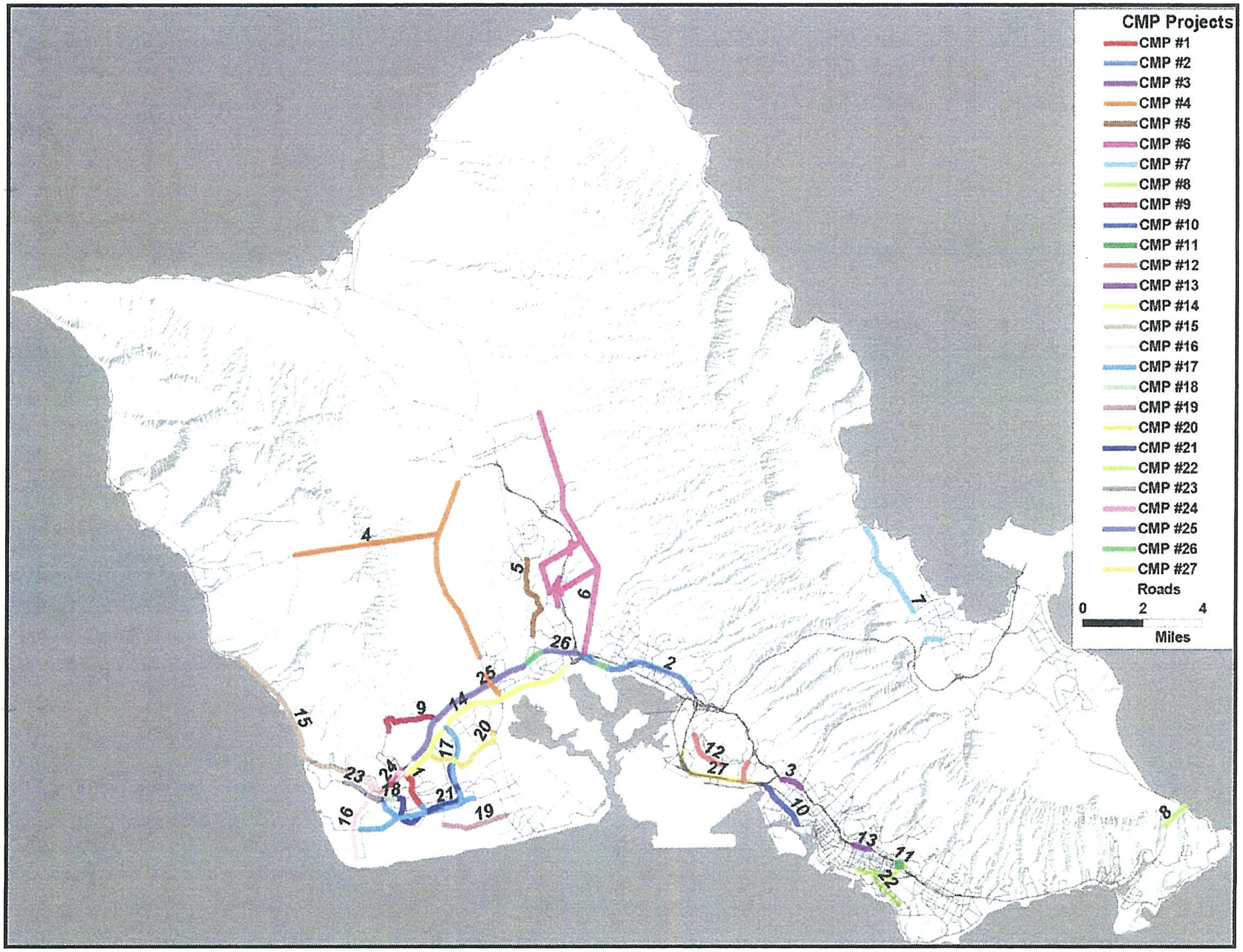

FIGURE 8: OAHU'S CMP NETWORK
TWO-HOUR AM PEAK

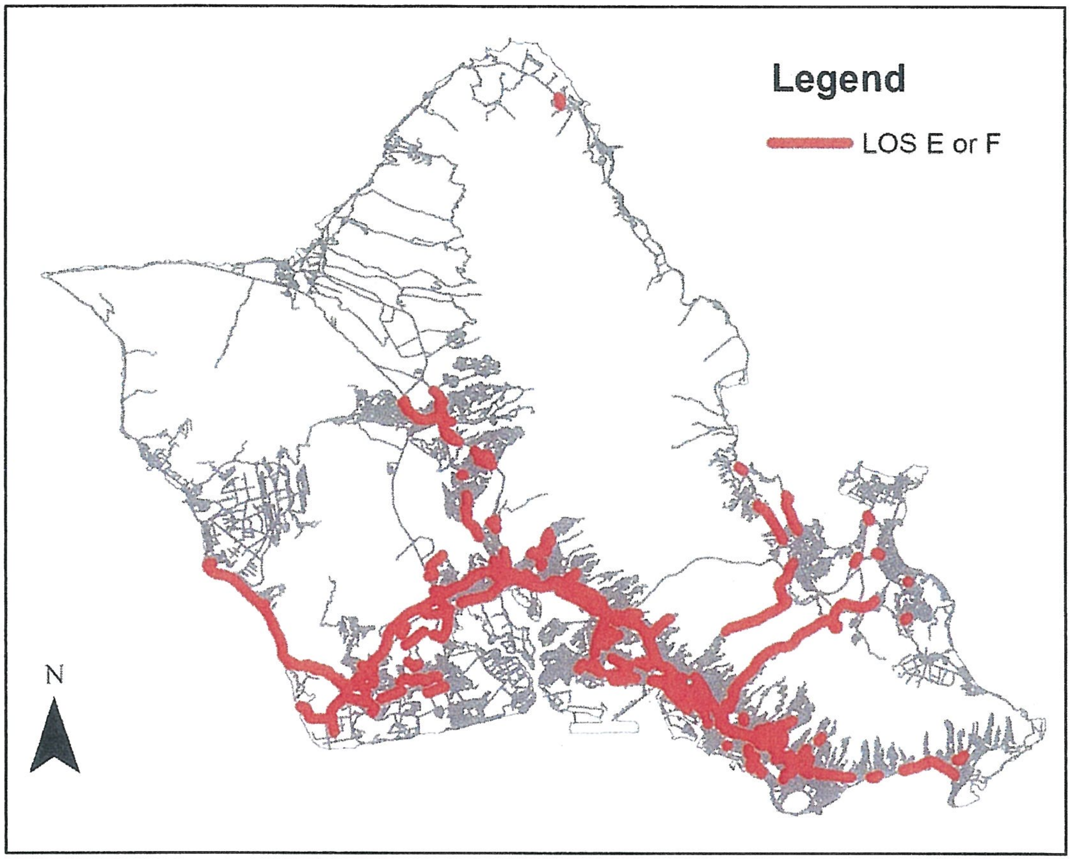

TABLE 15: LOCATIONS OF SIGNIFICANT CONGESTION (LOS E OR F)

1.	Dillingham Boulevard Koko Head-bound between Middle Street and Alakawa Street.
2.	Farrington Highway Koko Head-bound between Maliona Street in Waianae and the Interstate Route H-1 on-ramp in Waipahu.
3.	Fort Barrette Road between Kamaaha Avenue and Farrington Highway mauka-bound.
4.	Fort Weaver Road mauka-bound between Aawa Drive and the Farrington Highway underpass.
5.	Interstate Route H-1 Ewa-bound between the Interstate Route H-1 / Interstate Route H-2 merge and Paiwa Street.
6.	Interstate Route H-1 Ewa-bound between Fifth Avenue and Middle Street.
7.	Interstate Route H-1 Koko Head-bound between the Kapolei Interchange at Kalaeloa Boulevard to the Halawa Interchange.
8.	Interstate Route H-1 Koko Head-bound Middle Street merge to Punahou Street.
9.	Ka Uka Boulevard Interchange (over Interstate Route H-2) both directions.
10.	Kahekili Highway town-bound between Hui Iwa Street and Haiku Road.

LOCATIONS OF SIGNIFICANT CONGESTION (LOS E OR F), CONTINUED

11.	Kalaeloa Boulevard makai-bound between Farrington Highway and makai of Malakole Street.
12.	Kalakaua Avenue Koko Head-bound between Kanunu Street and Kuhio Avenue.
13.	Kalanianaole Highway Ewa-bound between Lunalilo Home Road and Halemaumau Street.
14.	Kalanianaole Highway Ewa-bound between Halemaumau Street and Interstate Route H-1 at Ainakoa Avenue.
15.	Kamehameha Highway makai-bound between Whitmore Avenue in Wahiawa to the Interstate Route H-1/ Interstate Route H-2 merge in Waipahu.
16.	Kapolei Parkway Waianae-bound between Kolowaka Drive and the new University of Hawaii West Oahu campus East Kapolei Road.
17.	Kunia Road makai-bound between Kupuna Loop and the Interstate Route H-1 west-bound on ramp.
18.	Kunia Road mauka-bound between Farrington Highway and the Interstate Route H-1 east-bound on ramp.
19.	Likelike Highway town-bound in Kaneohe.
20.	Makakilo Drive makai-bound before the Interstate Route H-1 Interchange.
21.	Malakole Street.
22.	Moanalua Freeway Koko Head-bound between Red Hill and Middle Street.
23.	Moanalua Road Koko Head-bound between the Interstate Route H-1 east-bound Waimalu/Pearlridge off ramp and Honomanu Street.
24.	Nimitz Highway Koko Head-bound between Middle Street and Alakawa Street.
25.	North King Street Koko Head-bound between the North King Street off-ramp from Moanalua Road to Liliha Street.
26.	Old Waialae Road Ewa-bound over Interstate Route H-1 to South King Street.
27.	Pali Highway town-bound from Kaneohe to Downtown (Vineyard Boulevard).
28.	Puuloa Road mauka-bound toward Interstate Route H-1 makai of Pukoloa Street.
29.	Salt Lake Boulevard Koko-Head bound between Ala Kapuna and Ala Lilikoi.
30.	Wilikina Drive town-bound between McCornack Road and Interstate Route H-2.

4.0 PURPOSE OF THE CMP BASELINE RESULTS

In presenting Oahu's story, the scene is being set for the comparison of proposed congestion-relief strategies (e.g., TIP and ORTP projects) to the year 2035 baseline condition. The way in which this will be achieved will be through the use of performance measures, as described in the *CMS Performance Monitoring and Evaluation Plan*.

Proposed congestion relief projects will be evaluated, as appropriate, using the OahuMPO travel demand forecasting model. The results of each project will be compared with those of the baseline (as presented in this report), and then ranked, as described in the *CMS Performance Monitoring and Evaluation Plan*.

5.0 CONCLUSION

Analysis of the CMP year 2035 baseline results has shown that Oahu's story looks rather grim if no improvements are made to the transportation system other than projects that are already funded for implementation within the next few years.

Population in the PUC is projected to increase by over 64,000 residents by year 2035. Population in the Ewa area is forecasted to increase by 96,000 residents, more than double the number of Ewa residents as compared to year 2007. In Central Oahu, the population is projected to increase by more than 37,000, or 24%.

Future employment in the PUC is projected to increase by about 13%, or 52,000 jobs. By the year 2035, work trips to and from the PUC by Ewa residents are projected to increase by about 7% and trips by Central Oahu residents are expected to increase by 14%. The number and share of work trips to Ewa and Central Oahu are also expected to increase considerably by the year 2035. Ewa is forecasted to experience a 172% increase, while Central Oahu is forecasted to experience a 31% increase in work trips to the region. However, although additional work trips are forecasted to be made to Central Oahu and Ewa in the year 2035, the PUC is still expected to be a major employment destination, with 63% of the total work trips.

As a result, major roadways leading to the PUC are expected to operate at a poor or failing LOS by year 2035 if no improvements are made to the transportation system. More than 25% of the freeways, expressways, and ramps are forecasted to operate at LOS E or F during the two-hour AM peak period. Daily VMT, and the two-hour AM peak period VHT and VHD are all projected to increase by the year 2035. The roadway network on Oahu is currently used primarily by automobiles, and is expected to remain that way in the year 2035. Of the estimated 1,459,000 total daily resident trips to and from work in year 2035, 84% are projected to be in private automobiles, 9% are projected to be made by transit, and the remaining 7% are projected to be made by either bicycling or walking.

Daily VMT is projected to grow at a slower rate (16%) compared to the forecasted increase in daily resident trips (27%), which indicates that the average length of trips in year 2035 will be less than in year 2007, and that more trips will be made by transit. The shorter trips are likely due to more residents staying within the Ewa-Kapolei areas to work, as opposed to traveling to Downtown. Transit trips to and from work are forecasted to increase by more than 59%. This is likely due to the implementation of a fixed guideway system between Kapolei and Ala Moana Center, which will provide improved transit accessibility by year 2035.